

Research Priorities and Recommendations to Support Interjurisdictional Fisheries Management

ATLANTIC STURGEON

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Fishery-Independent Priorities

High

- Determine levels of bycatch and compare to F_{50} target levels for individual populations. Characterize Atlantic sturgeon bycatch in various fisheries by gear and season. Include data on fish size, health condition at capture, and number of fish captured.

Modeling / Quantitative Priorities

High

- Conduct assessments of population abundance and age structure in various river systems. Particular emphasis should be placed in documenting occurrence of age 0-1 juveniles and spawning adults as indicators of natural reproduction.¹
- Conduct further analyses to assess the sensitivity of F_{50} to model inputs for northern and southern stocks.

Life History, Biological, and Habitat Priorities

High

- Continue development of genetic markers to determine the extent to which Atlantic sturgeon are genetically differentiable among rivers and that permit identification of bycatch by population origin. Interpret biological significance of findings.²
- Develop methods to determine sex and maturity of captured sturgeon.³
- Determine length, fecundity, and maturity-at-age for north, mid, and south Atlantic stocks.
- Refine maturation induced spawning procedures. Refine sperm cryopreservation techniques to assure availability of male gametes.⁴

¹ There are two surveys in the Hudson River estuary, one by Hudson Valley power generating companies started in 1985 and one by NYSDEC started in 2004. There is a survey in Edisto River, SC that started in 2004. Additionally, there are ongoing telemetry studies in many southeastern rivers which capture spawning adults.

² Work done by Tim King.

³ Work being done by James Sulikowski investigating the use of steroid hormones to determine sex by maturity. Laparoscopic techniques have been developed to visually inspect gonads by Dr. Rob Bakal, USFWS, Aquatic Animal Health Coordinator, National Fish Hatchery System.

- Continue basic cultural experiments at all life stages to provide information on efficacy of alternative spawning techniques, egg incubation and fry production techniques, holding and rearing densities, prophylactic treatments, nutritional requirements and feeding techniques, and optimal environmental rearing conditions and systems.⁵
- Conduct research to identify suitable stocking protocols for hatchery fish (e.g., fish size, time of year, site, marking technique).⁶
- Conduct and monitor pilot scale stocking programs before conducting large-scale efforts that encompass broad geographic area.⁷
- Establish stocking goals and success criteria prior to development of large-scale stock enhancement or recovery programs.
- Evaluate aging techniques for Atlantic sturgeon with known age fish. Emphasis should be placed on verifying current methodology based on fin spines.⁸
- Establish tolerance of different life stages in all populations to important contaminants and environmental factors (e.g., DO, pH, temperature, salinity).⁹
- Quantify the amount and quality of sturgeon habitat in important sturgeon estuaries and rivers, including spawning and nursery habitats. Define and map bottom water quality, velocity, and substrates types for suitable sturgeon spawning and nursery habitat.¹⁰
- Determine behavior and effects on life history from the effects of dredging and increased suspended sediment loads.¹¹
- Determine impacts of pile driving and other in-river construction on behavior and life history.

Moderate

- Analyze existing sea sampling data to characterize at sea migratory behavior. Use electronic tagging to model coastal migrations of juvenile and adult Atlantic sturgeon.¹²
- Assess loss to ship/boat strikes.¹³

⁴ Successful spawning of wild female sturgeon in captivity has been documented at Bears Bluff National Fish Hatchery. There has been some work done on sperm cryopreservation techniques by William Wayman and Curry Woods.

⁵ Transport, long-term holding, and feeding work done at Bears Bluff National Fish Hatchery. Atlantic sturgeon also being held at USFWS Northeast Fishery Center.

⁶ Work has been done on long-term survival of hatchery-produced fish stocked in the Hudson River (Mohler et al. 2012).

⁷ Stocking programs were initiated in the Hudson River in 1994 and 2004 and in the Nanticoke River in 1994.

⁸ Work done by Stevenson and Secor, Dunton et al. in the NJ-NY region, and Balazik et al. in the James River. Work also in progress by SCDNR assessing telomeres as a possible method to age Atlantic sturgeon.

⁹ Work done by Secor (D.O.), Roy et al.(contaminants) and Matsche et al. (nitrite). Work in progress by Markin and MDNR (salinity, temperature, D.O. and turbidity) for different ages and life history stages.

¹⁰ Data on benthic substrate and telemetry of juvenile and mature fish available for the Hudson River Estuary.

¹¹ SCDNR is currently monitoring sturgeon behavior as part of dredging events in Savannah and Charleston.

¹² Work done by Erickson et al. and Dunton et al. with PSAT tags and trawl surveys. Work done by Laney et al. 2007 in AFS Symposium 56. Telemetry work in progress along the coast.

Low

- Identify rates of tag loss and tag reporting.
- Encourage shortnose sturgeon researchers to include data collection for incidentally captured Atlantic sturgeon.

Additional Habitat Research Recommendations

- Fish passage requirements and appropriate structures for Atlantic sturgeon are largely unknown. Research all fish passage requirements for Atlantic sturgeon.
- Passage facilities should be designed specifically for passing Atlantic sturgeon for optimum efficiency at passing this species.
- Fish passage facilities should be designed to aid in the upstream and downstream passage of all life stages of Atlantic sturgeon. Most fish ladders in Atlantic coast streams and rivers are designed to pass alosines, and the specific needs of sturgeon will need to be considered as passage facilities are improved or constructed.
- The removal of dams, or the consideration of passage efforts, should be focused on those systems where Atlantic sturgeon historical habitat loss through blockage is greatest.
- Determine appropriate water flow for spawning Atlantic sturgeon. Water flows should be restored to appropriate levels during spawning season.
- Protection or restoration of critical habitat is considered the most beneficial conservation method for the restoration of sturgeons. Restore degraded historical habitat wherever possible. Also, habitat improvements that increase the survival of YOY are likely to make a strong contribution to population growth.
- New spawning habitat should be created with the use of artificial reef materials in areas where hard substrate has been degraded. Created habitat should be evaluated for effectiveness and longevity.¹⁴
- ASMFC should designate important habitats for Atlantic sturgeon spawning and nursery areas as HAPC.
- Standardize PIT tagging and ultrasonic telemetry equipment and procedures.¹⁵
- Further develop techniques for capture, transport, and long-term holding of wild brood stock.³³
- Standardize collection procedures, and develop a suitable long-term repository for Atlantic sturgeon biological tissues for use in genetic and other studies.¹⁶
- Map all known ocean captures and delineate winter range and foraging hotspots.

¹³ Work done in the James River by Balazik et al. 2012. Some work done by Brown and Murphy on the Delaware River. NYSDEC maintains a log of annual losses in the Hudson River Estuary.

¹⁴ Some work done on the James River and work proposed on the Delaware River by Brundage et al.

¹⁵ PIT tagging has been standardized.

¹⁶ Collection work done by Damon-Randall et al. and Kahn and Mohead. Tissue repository at CCEHBR in Charleston, SC.